

# **Math and Science Instructors' Perceptions of Their American Indian Students at a Sub-Baccalaureate Technical College: A Delphi Study**

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## **ABSTRACT**

*Instructors have long been known to be a major influence on American Indian student success in college, but much is still unknown on exactly how and where this influence exerts itself. Based on the perceptions of math and science instructors at one college of their American Indian students, this article seeks to pinpoint areas where more detailed research on American Indian student success factors appears promising.*

## **Introduction**

Scholars have argued for many years that American Indian students have unique values, beliefs, attitudes, goals, and needs that instructors at the college level must take into account if they want their students to be successful (Jackson & Smith, 2001; James, 1992; O'Brien, 1990; Pottinger, 1990; Scott, 1985; Swisher, 1994; Wilson, 1998). However, too few faculty members have understood, respected, and acted upon these needs, and their attitude has contributed to high non-completion rates among Native students (Dodd, Garcia, Meccage, & Nelson, 1995; Pewewardy & Frey, 2004; Tate & Schwartz, 1993).

Low graduation rates are an issue many tribes are working to rectify. They need leaders with college educations and advanced vocational training to help retain tribal languages, cultures, and identities; manage tribal resources; support tribal political and economic development; and work with institutions of the mainstream society (Benally, 2004; Demmert, 1997). Tribal members who do not complete their education in turn have a higher incidence of unemployment and need for public assistance and thus take money from public coffers instead of paying into them (Pewewardy & Frey, 1998). However, the needed education is most likely going to take place at an institution which operates on white, middle-class values and has little understanding of the cultural differences and needs of American Indian students (Bowman, 2003; Cajete, 1994; Gilbert, 2000; Huffman, 2003).

Despite the low completion rates for American Indian college students mentioned above, researchers also had encouraging findings to report, in particular that such high dropout rates were not related to academic ability (Wollock, 2001) and that students could in fact succeed in an educational environment informed by the values of the dominant (i.e. white) culture (Benjamin, Chambers, & Reiterman, 1993; Tierney, 1995).

Consequently, faculty members must show an understanding of their American Indian students' unique cultural backgrounds and classroom needs and adjust their instructional methods if students are to persist and are to feel welcome on campus and in class. According to Benjamin, Chambers, and Reiterman (1993), American Indian cultures have their own ways of

valuing and encouraging persistence, which manifest themselves in certain preferences for learning styles, assessment methods, and relationships to people in authority. If colleges were willing to build on such cultural capital, it would send a positive message to American Indian students about being respected on campus and could play a role in increased retention (HeavyRunner & Marshall, 2003; Hornett, 1989). The focus on instructors is justified for this study because they are the college employees students tend to have the most contact with, usually between three to five hours per week depending on the course. If instructors are truly student-centered, they must adapt to the needs of their students and not expect students to be the ones to change (Aragon, 2002; Gilbert, 2000; Wilson, 1998).

To learn more about how instructor attitudes have an effect on American Indian student performance and retention, we first of all need information about the perception and understanding of Native students by instructors who have been successful in teaching them. Having this information may help in determining how instructors can improve their instructional design, their teaching methods, and their interactions with American Indian students, all of which have been mentioned as success factors.

Great Plains Technical College (GPTC), the institution chosen for this research, is a primarily sub-baccalaureate technical institution in eastern Oklahoma that offers mostly Associate of Applied Science (A.A.S.) degrees in areas such as automotive technology, construction technology, heavy equipment technology, air conditioning, information technologies, engineering technologies, visual communications, precision agriculture, and culinary arts. Based on the Spring 2007 enrollment report, 23.9% of all students self-identified as American Indian, and almost three-quarters of all students were enrolled in terminal-degree programs leading to employment after graduation. GPTC was chosen as the site for this research because the institution has an overall graduation rate for American Indian students that stands at a 33.8% average for the 1996 to 2003 student cohorts with rates as high as 38.46% for the 2002-2003 cohort. This means American Indian students earn Associate's degrees in occupational majors at over five times the rate of 6.2% reported as the national average (Bailey, Jenkins, & Leinbach, 2005).

This discrepancy indicates that factors may exist at GPTC that contribute to the success of American Indian students, and instructors' perceptions of and attitudes toward their students may be one of those factors. Instructors at GPTC may have a better understanding of how their American Indian students are different from other students and thus develop better insights into their needs. Such an understanding may then be the foundation for classroom policies and practices that are supportive of students' learning styles and in the long run promote retention.

## **Purpose of the Study**

The purpose of this study was to determine how math and science instructors at GPTC perceive their American Indian students as unique in the classroom and how those perceptions may offer clues about possible success factors for student retention and suggestions for further study.

## **Main Research Question**

Which conclusions about success factors for American Indian college students and the need for further research can be drawn from the perceptions of math and science instructors at GPTC?

## Literature Review

Several barriers to student success and reasons for failure have been identified and discussed in the literature. The first barrier relates to cultural values. Cultural inconsistencies between community or family values and the values of the college environment, confusion about right or wrong behaviors, confrontation with and internalization of white stereotypes, and an inability to return to a culturally familiar environment for guidance all serve to encourage American Indian students to develop an oppositional stance toward their education and be more likely to drop out of college if problems arise (Carnegie Foundation, 1999; Huffmann, 1991; James, 1992; Lin, 1990; O'Brien, 1990; Pottinger, 1990; Scott, 1985; Tierney, 1993; Wilson, 1998; Wollock, 2001). Another barrier exists in college readiness. Poor academic preparation, unclear career plans and insufficient career maturity, a lack of study skills, inadequate financial support, and parental opposition to higher education all contribute to academic difficulties and lack of progress (Guillory, 2002; Hoover & Jacobs, 1992; Huffmann, 1991; Jackson & Smith, 2001; James, 1992; Lin, LaCounte, & Eder, 1988; O'Brien, 1990; Pottinger, 1990; Tate & Schwartz, 1993; West, 1988).

A third barrier can be found in matters of academic and social integration. Many students feel that the college environment constitutes a hostile atmosphere where they are not welcome. The perceived need to suppress or even change their cultural orientation in an educational environment designed for someone else, a competitive classroom environment, insensitivity from and lack of interaction with professors, frustration with having to deal with the same misconceptions at each level of the university bureaucracy, and insufficient support services makes students feel alone, stressed, and vulnerable and increases their risk of dropping out (Brown & Robinson Kurpius, 1997; Huffmann, 1991; Jackson & Smith, 2001; Lin, LaCounte, & Eder, 1988; O'Brien, 1990; Pottinger, 1990; Scott, 1985; Tate & Schwartz, 1993; Tierney, 1993; Wilson, 1998).

Many of the problems mentioned above, Scott (1985) asserted, can be linked to the history of American Indian education. Repeated attempts at assimilation and denigration of American Indian cultures in the educational system had led to self-loathing and low self-esteem (Pewewardy & Frey, 2004) or open resistance to being forced to adhere to white standards (Hampton, 1993). One way to remedy this situation is to focus on instructor-student relationships because American Indian students' positive experiences on campus in general and in the classroom in particular are closely tied to the quality of interaction students have with their instructors (Cole & Denzine, 2002; Dodd et al., 1995; Hornett, 1989; Reyhner & Dodd, 1995). Because of their frequent contact with students, instructors can most directly have an influence on student persistence and play a pivotal role in helping American Indian students complete their degrees (Dodd et al., 1995; Hornett, 1989).

To make the most of such interactions, instructors first of all need cultural sensitivity. They must show respect for and open-mindedness toward American Indian cultures (Wentzlaff & Brewer, 1996; Wilson, 1998) and also acquire a certain degree of cultural knowledge and awareness so that they may respond to students in culturally appropriate ways (Aragon, 2002; Hornett, 1989; Wentzlaff & Brewer, 1996; Wilson, 1998). If an attitude of sensitivity and respect is prevalent, instructors will be better able to assist students in overcoming some of the barriers they face, and students in turn will feel better about themselves, have a more positive attitude toward their education, and be more likely to cooperate with learning activities and to persist (Hornett, 1989).

Faculty support, both in terms of advisement, teaching, and personal relationships, is important to many students, especially to those who are not yet sure about their educational future and their career plans (Brown & Robinson-Kurpius, 1997; Tate & Schwartz, 1993; Wilson, 1998). Students need evidence that they are indeed respected (Dodd et al., 1995; Reyhner & Dodd, 1995), and especially a warm and caring relationship between students and faculty members could greatly reduce feelings of alienation, change students' perceptions of campus racism and discrimination, and lead to improved classroom performance (Brown & Robinson-Kurpius, 1997; Dodd et al., 1995; Guillory, 2002; Reyhner & Dodd, 1995; Wilson, 1998). Examples of caring include being available and accessible to students (Wilson, 1998), offering support to students who appear to be struggling academically or socially (Hornett, 1989), and sharing aspects of one's personal life that students can relate to (Wilson, 1998). Under these circumstances, students will feel less alienated and more accepted on campus (Hornett, 1989; Wentzlaff & Brewer, 1996) and become more academically involved in the classes (Brown & Robinson-Kurpius, 1997; Wilson, 1998).

The literature was divided on how well the development of a supportive faculty attitude had been achieved. Some authors asserted that students found their professors to be supportive and sensitive and that their most positive campus experiences had happened in the classroom (Huffmann, 1991; Hoover & Jacobs, 1992). Others found that some faculty members engaged in stereotyping and showed a lack of respect for American Indian values (Benjamin, Chambers, & Reiterman, 1993) and that a significant percentage of faculty members were directly or indirectly hostile to American Indian students (Guillory, 2002; James, 1992). Such behaviors and attitudes then could be an obstacle to persistence and achievement (Dodd et al., 1995).

A major step forward for faculty members trying to be responsive to their students' needs, many scholars asserted, lay in the recognition that learning styles among American Indian students are different from those of white students and require appropriate learning activities (Gilbert, 2000; James, 1992). Wilson (1998) did not mince words in declaring that American Indian students learn better if instructors are indeed sensitive to their learning styles. Cultural values affected not only students' perceptions of themselves and their environment but also their preferred ways of learning and of proving competence to an instructor. For American Indian students, the common approach to learning is a five-step process: observation of someone else performing a task, asking questions about the task, further observation, private practice without an audience, and finally performance (James, 1992; Swisher, 1994). Some of the cultural values (group harmony, careful listening and observing, importance of non-verbal communication, non-interference with other people's decisions and way of life, importance of saving face in front of

peers) can thus be tied directly to preferred learning styles such as kinesthetic learning and small group work (Gilbert, 2000; Hornett, 1989; James, 1992; Swisher, 1994).

Especially cooperative learning is said to be well suited for American Indian learning styles (Aragon, 2002; Cole & Denzine, 2002). Collaborative assignments, problem-solving, and learning at their own pace by trial and error gives students the opportunity to become active, self-directed participants in the learning process and helps them become engaged with the material instead of showing avoidance and withdrawal out of fear of embarrassment. Instructors have to allow students to learn at their own pace and show mastery when they are ready. If students are pushed to the performance step too soon, they will likely pull back for fear of losing face in front of their peers (James, 1992).

Kirkness and Barnhardt (1991) seconded such conclusions. They asserted that teaching is a joint process in which faculty members build on the cultural values of their students to construct new paradigms that empower students to interpret their reality more from the position of an equal than an outsider. The interviews conducted by Guillory (2002) with American Indian students further support the view that personal and warm relationships with faculty members in the classroom are one of the crucial elements of student persistence.

Recommendations focused on a pragmatic approach to teaching American Indian students. On a personal level, they included that faculty members adapt more to the needs of their students by accepting American Indian cultural ways; value and build on the knowledge and experience their American Indian students bring to class; emphasize positive American Indian values; help students develop their self-concept; promote relaxed communication and warm relationships by injecting personal experiences into teaching; and be available for questions and tutoring during office hours (Dodd et al., 1995; Gilbert, 2000; Gilliland & Reyhner, 1988; Wilson, 1998).

As for teaching methods, active and experimental learning (Tierney, 1995; Wilson, 1998), personal examples (Dodd et al., 1995), cooperative assignments (Aragon, 2002; Gilbert, 2000; Reyhner & Dodd, 1995), student-centered learning (Aragon, 2002; Bowman, 2003; Tierney, 1995), and ongoing feedback that is positive whenever warranted (Aragon, 2002; Dodd et al., 1995; Tierney, 1995), were all mentioned as strategies appropriate for American Indian students.

## **Methodology**

The Delphi method was chosen as the appropriate methodology because it is used to gather input from experts when little prior research exists on a topic, when the problem is hard to define in quantitative terms or in survey questions, and when finding a solution may benefit from people's personal insights (Linstone & Turoff, 1975). In education, for example, universities may plan to implement new campus policies, services, or curricula but have little prior information on what may and may not work. Regarding American Indian student retention, James (2001) asserted that despite numerous studies and publications over the past 30 years, very little was still known about the factors that might lead to higher retention rates.

## **General Methodology**

A Delphi generally consists of a simple questionnaire or input form that is given to all participants. Once the responses have been returned to the study monitor, they are analyzed, the questionnaire is redesigned, and the new questionnaire is presented to the participants for another round of input. During the first round of input, participants usually explore the question(s) by providing whichever responses they deem useful. During the second round, an attempt is made to see if participants can reach agreement on certain views on the issues (usually in terms of importance, desirability, or feasibility). In the final round, all information has been analyzed and is sent to the participants for a final evaluation (Linstone & Turoff, 1975). The idea behind this method is that as participants are exposed to the opinions of others, responses will slowly converge toward consensus.

## **Participant Sample**

Nine faculty members at GPTC teach courses in math (business math, algebra, calculus, trigonometry, basic statistics) and various natural sciences (physics, chemistry, biology, human anatomy). Administratively, all math and science instructors are part of the Division of Arts & Sciences. They were chosen because of the emphasis the GPTC strategic plan places on the teaching of science and technology (GPTC, 2007). Eight instructors agreed to participate, and of those eight, seven ended up completing all input forms for all four rounds of the Delphi. [One participant dropped out after the second round.] Of the eight original participants, six were male and two female. As for ethnic background, one was American Indian, one African American, one Latino, and the rest were Caucasian. Six of the eight participants had grown up in eastern Oklahoma, and two were from other parts of the United States.

## **Procedure**

Input forms and aggregate results for each round were distributed electronically by e-mail. Completed input forms were left in the researcher's mailbox on campus to maintain confidentiality. In addition, all participants were asked to draw a secret number, which they subsequently affixed to each input form. This number allowed this researcher to track if everyone had provided input without being able to match responses to a specific person.

In Round 1, participants were asked to provide any perceptions they may have had on how their American Indian students were different from other students. They were asked to write down a list of differences in no particular order. This researcher wanted to prevent leading participants too much by designing a survey instrument such as a questionnaire with a Likert-type scale based on findings from other kinds of institutions. Because of the assumption that GPTC may have success factors present that are absent elsewhere, clues about these factors may have remained unstated with a prepared questionnaire. Therefore, the raw, unadulterated input from all participants was desired.

After the input forms had been returned, all responses were collected in no particular order on a new input form for Round 2, and participants were asked to complete two tasks: identify their top ten differences from among all the responses and rank them in the order of

which difference was most noticeable. Once all input forms had been returned, the ten most frequently mentioned differences were first identified, and the mean ranking score for these ten differences was calculated to arrive at the aggregate ranking.

For Round 3, all but the top ten differences were deleted from the form. For each response, participants were given the mean score as well as the overall ranking, but responses were not arranged according to ranking. They were then asked to rank the ten differences one more time, taking their co-workers' input into consideration. An additional space on the input form was provided in case anyone wished to make written comments about his or her choice. Only two participants chose to take advantage of this opportunity for a total of four comments. The Round 4 form presented participants with the aggregate mean scores and rankings for Rounds 2 and 3 as well as the unedited comments from Round 3. They were now asked to provide a final ranking and choose their top five most noticeable differences between American Indian and other students in class.

### **Data Analysis**

Once the top five most noticeable differences had been identified, they were compared to what previous research had found about success factors and barriers. Particular attention was paid to whether the input of this Delphi study showed any correlation with or deviation from findings in the literature on American Indian post-secondary success and if any implications for further study could be drawn from the findings as applied to policies and practices at GPTC.

### **Limitations**

One limitation of this study was the number of participants. Although a complete sample was attempted and almost all math and science instructors agreed to participate, input from only seven participants has limited generalizability. Second, there was no guarantee that all students who were American Indian had been identified as such by their instructors, and behaviors may have gone unreported because instructors were not aware that a student was American Indian. Student ethnicity is not reported to GPTC instructors; the two most common methods of recognizing a student as American Indian are through student self-identification (students identify themselves as American Indians by stating their tribal affiliation or making allusions to their heritage) and through signing student time sheets (many students are sponsored by their tribes, and instructors must sign student time sheets to verify attendance). Third, only a limited number of tribes are represented at GPTC. The majority of American Indian students on campus are members of the Muscogee (Creek) Nation and the Cherokee Nation of Oklahoma, and their experiences may differ from those of students of other tribal cultural backgrounds.

## Findings

Table 1  
Most Noticeable Differences Final Round Results

	Most Noticeable Difference Ranking Mean (= M)	Panel Ranking for Most Noticeable Difference
Quiet in class compared to other students	M = 1.86	1
Ask few questions in class	M = 2.67	2
Tend to have very good attendance	M = 3	3
May miss class due to illness of a relative other than spouse or children	M = 3.25	4
Miss class more for reasons related to family situations	M = 3.25	4
More reserved	M = 4.25	5

The findings can be divided into two major themes: attendance and class participation (As for attendance, a first glance appears to indicate a contradiction between the items ranked third and fourth respectively. How can students be absent more frequently than others yet still have very good attendance? Frequent absences for familial reasons have been identified as a major barrier by several studies. The need to return home in the middle of the semester to celebrate family or community events, mediate family conflicts, and deal with medical, financial, and legal family crises as well as the displeasure voiced by some families if students attend college too far from home were all cited as major factors in low student retention rates (Benjamin, Chamber, & Reiterman, 1993; Jackson & Smith, 2001; James, 1992; Lin, LaCounte, and Eder, 1988; Pewewardy & Frey, 2004). GPTC students appear to conform to the reported pattern of frequent absences for familial reasons, but at the same time, the feedback about good attendance and the higher-than-usual graduation rate speaks to students' persistence even in the face of multiple family issues. It further suggests that instead of dropping out, GPTC's American Indian students return from these absences and complete their studies at higher rates than students at other colleges. Therefore, some factors appear to be present at GPTC that motivate these students to return and persist.

Second, the mention of students' quiet, reserved behavior in class can be seen as indicative of the common American Indian approach to learning consisting of observation, asking few questions, further observation, private practice, and performance (James, 1992; Swisher, 1994). As mentioned earlier, many American Indian students drop out of college because instructional methods are inappropriate for their learning styles. If, however, the American Indian students at GPTC exhibit the traditional American Indian approach to learning but are more successful in persisting than their peers elsewhere, factors may exist in the math



and science classrooms that make these students comfortable enough to stay and successful enough to complete their programs of study.

The next step, however, is not to jump to the development of retention strategies but instead to work at understanding the problem at a deeper level. Based on the responses from GPTC's math and science instructors, there are a number of indicators suggesting to researchers where their efforts may be focused most effectively in the future.

## **Discussion and Recommendations**

Some ideas as to why students at GPTC are more persistent than students elsewhere can be gleaned from the literature. Wilson (1998) stated that if students saw value in what they were studying, they would be more motivated to persist, and Tierney (1993) ascribed wanting to learn skills to deal and work with emerging technology as an important student motivation. Such comments suggest that the technical subject matter taught at GPTC may be related to student retention and helps students find the motivation to continue their education. Several recommendations for further research then result. The relationship between technical education and retention is certainly worthy of further investigation. Is there something motivational about technical education, as Tierney (1993) suggested, that encourages students to persist in their studies? Could, for example, a connection between knowledge and skills acquired in college and the applicability of these skills to solving tribal and community problems as suggested by Tippeconnic (2000) and Tierney (1995) be a motivational factor? Are students more motivated if they see how their skills are useful for the development of their tribal communities, or are students primarily motivated by the high graduate placement rate (up to 100% in some programs) and potential future financial gains?

A related topic is that of career maturity and efficacy. West (1988) as well as Jackson and Smith (2001) identified these as major factors in student retention and satisfaction. GPTC actively recruits students based on the technical programs the university offers. It also has cooperative agreements with regional Career and Technology Centers, and many students arrive on campus after attending one of those centers. It is thus possible that because GPTC offers mainly terminal degrees that lead to employment, not further education, students attracted to this institution may already have clearer career goals than students in non-technical programs of study elsewhere. Further research is therefore needed to explore if there may be differences in career efficacy between students who enroll in technical programs of study to earn a terminal degree and enter the workforce upon graduation and those who plan to transfer to a four-year program after receiving an A.A.S. degree and the role career efficacy plays in the retention rates for each group.

In addition, those students who are products of the career and technical education system (both at the secondary and the post-secondary level) may have received better career development counseling than students on a strictly academic track. Much has been written on career counseling for American Indian students, but a clear link to persistence has yet to be established (Herring, 1990; Martin, 1991, 1995; McCormick & Amundson, 1997; Peavy, 1998). Could the availability of career development counseling and the quality of such counseling be factors in student persistence?

A final consideration when it comes to career maturity could be that GPTC enrolls a mix of students with different academic backgrounds. Some move directly from high school to college while others work for a few years before they realize that their chances for advancement are limited without a college degree. Other students have attended a Career and Technology Center and now wish to further their education in the same field. A third group of students consists of students who never graduated from high school but have earned a GED and want to rise above minimum wage jobs in the service industry or hard physical labor. The final group includes returning adult students looking for a new career because their jobs have been offshored and their skills are no longer in demand or students who for familial or personal reasons wish to return to the workforce later in life. A comparative study of these groups of students may show if their prior educational, occupational, or life experiences may be positively linked to retention and persistence.

Another success factor for American Indian students mentioned in the literature was class size. Wilson (1998) described large classes as overwhelming for students and small classes and a more communal feeling as supportive. GPTC tries to cap most math and science courses at 20 students, but because of enrollment management needs, not all classes can be that small. The question then becomes to which extent class size is a factor in student retention. Can a correlation be drawn between different class sizes and retention rates? Do such correlations differ depending on a student's program of study?

Furthermore, what is the relationship between class size and instructor-student interaction? The literature emphasized caring, respectful relationships as a major success factor, and several authors confirmed that motivation to persist was linked to the type of relationship that existed between students and instructors (Brown & Robinson-Kurpius, 1997; Jackson & Smith, 2001; West, 1988; Wilson, 1998). How does class size contribute to the development of supportive relationships between instructors and students? Small courses certainly allow for more individual attention and one-on-one help, but not all instructors might be comfortable with establishing close relationships with their students even if these are deemed necessary for academic achievement and retention. Can class size be a mitigating factor for retention if an instructor is more distant, and can instructor effort overcome larger class sizes? The effect of instructor-student interaction and class size on retention also deserves more detailed study.

Many of the lab science courses at GPTC use collaborative group projects and active, problem-based learning to help students understand scientific concepts. These methods according to the literature align better with American Indian learning styles than traditional lecture and thus may also contribute to higher retention rates (Aragon, 2002; Bowman, 2003; Gilbert, 2000; Reyhner & Dodd, 1995; Tierney, 1995; Wilson, 1998). Instructor comments that American Indian students are more quiet and reserved and ask fewer questions in class than other students appear to be a reflection of the American Indian approach to learning of observation, asking questions, further observation, private practice, and performance mentioned earlier. Student persistence suggests that math and science as well as technical education may lend themselves well to this learning style. Science classes often begin with a demonstration of a phenomenon or an experiment, which allows students to observe and ask questions if desired. Further experiments may follow, and students then have time during the lab portion of the course to practice the same experiments and work closely with the instructor, which removes possible

fear of failure in front of one's peers and develops a closer professional relationship between teacher and student.

Therefore, math and science pedagogy and methodology may be more compatible with American Indian learning styles than the instructional methods of other disciplines and help students persist in their studies. The lab environment with its individual attention for each student may just be the perfect context for developing desired instructor-student relationships or, alternatively, a mitigating factor if an instructor prefers a close professional but less personal relationship with students. A study comparing American Indian student achievement and persistence in math and science course as opposed to humanities and social science course may shed some light on whether there is a connection between instructional methods in science and student retention and what the implications may be for instruction in other disciplines.

A last success factor mentioned in the literature was familiarity with a mainstream environment. Some studies showed that those students who were familiar with the dominant culture in the United States had a much higher rate of retention than other students because they were better able to navigate a mainstream college environment (Brown & Robinson Kurpius, 1997; Scott, 1985). Oklahoma differs from many other states that have substantial American Indian populations in that the state has no reservations. Some communities have a majority American Indian population, especially in rural areas, but overall, there is considerable mixing of white and American Indian residents across the state. People live in the same communities and neighborhoods, attend the same schools, interact at work, worship together, and intermarry (Hamill, 2006). This familiarity may reduce the out-of-place feeling and perception of hostility reported in a large number of studies (Benjamin, Chambers, & Reiterman, 1993; Bowman, 2003; Huffman, 1991; Jackson & Smith, 2001; James, 1992; Lin, LaCounte, & Eder, 1988; Pewewardy & Frey, 2004; Tate & Schwartz, 1993; Wilson, 1998).

However, the literature does not provide a clear definition of the concept of "familiarity" and has yet to take a closer look at how familiarity is acquired. Do American Indian students learn about the mainstream culture from television, from interaction with peers and adults in a formal setting like school, from stories told by family members, or from interaction in an informal setting (e.g., living in a mixed community or neighborhood)? Future studies could focus on differences in the intensity and type of exposure to the mainstream culture and the relationship between such exposure and retention. The method or methods of becoming familiar with another culture could have implications for how someone reacts to a mainstream college environment.

## **Conclusion**

It has been said that despite numerous studies, little is known about what colleges can do to create a more supportive learning environment and to increase American Indian student retention (James, 2001). Overall, the perceptions of major differences between American Indians and other students by math and science instructors at GPTC indicate that instructors' feedback aligns with what is known about which behaviors are common for students and which barriers exist toward retention. The comparatively high graduation rates at GPTC and math and science instructors' understanding of some of the unique characteristics of their American Indian

students further suggest that some success factors exist on campus, and identifying such factors through further study may lead to insights on how to increase student retention.

Although small classes, warm and caring relationships, culturally appropriate teaching methods, motivation through technology learning, and familiarity with the dominant culture may all be success factors, they are not always present and not always attainable. What then happens at the intersection of these factors? Are one or two factors sufficient, or is retention possible only at the intersection of all of them? Can the presence of some factors compensate for the absence of others? Are some of these factors more important in the minds of students than others? Further study is needed to understand the impact of single factors and the relationships between different factors better, and this study has tried to provide some insight into which success factors may be at work in American Indian student retention and deserve further study.

Understanding success factors better can ultimately help instructors and administrators create a more supportive learning environment, encourage students to perceive the campus environment as inviting and sensitive instead of hostile, and lead to higher academic achievement and college completion rates of American Indian students. American Indian college graduation rates have lagged behind those of mainstream students for a long time. Anything we can learn about how to effect change is a step in the right direction.

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